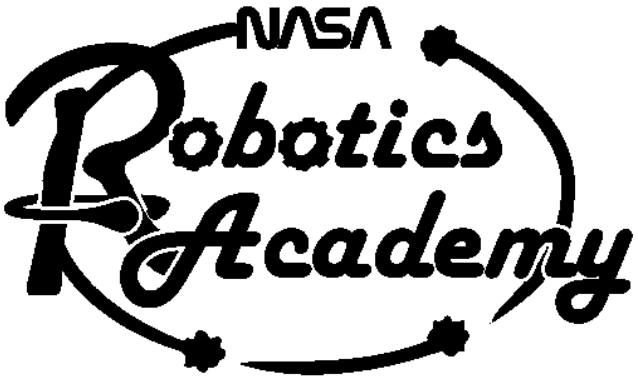
National Aeronautics and Space Administration

NASA ROBOTICS ACADEMY AT MARSHALL SPACE FLIGHT CENTER



PROFILE BOOK 2012

This is NASA's vision for the future. Our mandate is:

- To improve life here,
- To extend life to there,
- To find life beyond.

So, how do we get to that impressive picture of the future? Part of the answer is by executing NASA's mission:

- ***To understand and protect our home planet.***
- ***To explore the Universe and search for life.***
- ***To inspire the next generation of explorers … as only NASA can.***

Table of Contents

Program Description

The NASA Robotics Academy is an intensive resident summer program of higher learning for college undergraduate and graduate students interested in pursuing professional and leadership careers in robotics-related fields.

The NASA Robotics Academy program is designed to present a comprehensive package of information and experiences about the organization of the NASA Agency, some of its most important current and planned science, engineering, education, and technology enterprises, as well as a number of non-technical areas of critical significance. Besides attending lectures and workshops with experts in their field, the Robotics Academy students are involved in supervised research in a MSFC laboratory, and will participate in visits to other NASA Centers and a number of robotics-related academic laboratories and industries.

Eligibility, Selection Criteria, and Placement

The participants in the Marshall NASA Robotics Academy have been selected based on the following criteria:

- US citizenship or permanent residency
- Research Associates: Rising college freshman
- and sophomores
- Team Leads: Junior/senior undergraduates or
- graduate students
- High academic standing (GPA 3.0 or higher)
- Demonstrated prior involvement in robotics
- Propensity for teamwork

Both the selection process and placement of the Academy participants in Marshall's research groups were assisted by recommendations from faculty, administrators, academic supervisors, and co-workers, and the applicants' self-profiling essays.

A Brief History of the NASA Robotics Academy

The NASA Robotics Academy was founded in 2005 at the Goddard Space Flight Center (GSFC) with a vision to expand to other NASA centers. The Ames Chapter opened in 2006 and in 2007 Marshall Space Flight Center also began their preliminary year of the Robotics Academy.

The Robotics Academy began with the insight that robotics plays a critical role in NASA's Space Exploration Vision. The NASA Robotics Academy provides a pathway for students interested in careers in this exciting field. It can provide a bridge from high school programs such as FIRST, Botball and BEST to continued involvement in robotics research through undergraduate and graduate levels.

This year, the NASA Robotics Academy at Marshall Space Flight Center (MSFC) will train its sixth generation of Research Associates, building upon the program's five years of success.

Dynetics has delivered high-quality, high-value engineering, scientific, and information technology (IT) products and solutions to customers within the U.S. government and a range of other market segments since 1974. Headquartered in Huntsville, Alabama, with 1300 employees throughout the United States, Dynetics' mission is to bring expertise, integrity, and tenacity to every relationship and to demonstrate our commitment to customers by providing powerful solutions to their technical challenges in Intelligence, Missiles, Aviation, Cyber, and Space.

Dynetics is leading the Rocket City Space Pioneers (RCSP) team in pursuit of the Google Lunar X-Prize (GLXP). The GLXP is a $30 million competition for the first privately funded team to send a robot to the moon, travel 500 meters and transmit video, images and data back to the Earth. The RCSP team includes Teledyne Brown Engineering, Draper Laboratory, Andrews Space, Spaceflight Services, Moog, Pratt & Whitney Rocketdyne, Analytical Mechanics Associates, the University of Alabama in Huntsville, and Von Braun Center for Science & Innovation.

The RCSP project is currently in the 'Risk Reduction and Prototype' phase, performing trade studies, analysis, prototyping, and component tests as inputs for design decisions. RCSP is targeting a launch and lunar mission in 2015.

To support this effort, the Robotics Academy team will be advancing previous concept designs for the RCSP Lunar Rover by designing a Suspension and Drive System for the rover. This effort will be a key step in the development process for the RCSP Rover, as previous prototypes have not included suspension systems. The design tasks for the Academy Team are planned to include mechanical design, electrical design, software development, prototypes of system components, and rover test drives. The Research Associates will be expected to complete key reviews, including System Requirements Review, System Definition Review, and final Preliminary Design Review, as this task will be run as a short-term project to provide a 'real-world' experience.

Principal Investigator: *Ray McCormick*

Team Lead: *Allen Bordelon*

Research Associates: *Jason Entenmann*
Matt Anderson

Louisiana State University
Baton Rouge, LA
Electrical & Computer Engineering
Math & Digital Media Minor
Bachelor of Science
Email: AllenBordelon@gmail.com

Research and Experience

- **NASA Robotics Academy:** May 2011 to August 2011
  - Worked on the design of a lunar lander test bed for Rocket City Space Pioneers
- **LSU LaACES program:** August 2009 to Present
  - Propose, design, build, and fly scientific balloon payloads
- **Iberville Parish School Board:** January 2008 to Present
  - Office work, Stage Director, Camp Counselor, Lego Robotics Coach
- **LSU College of Engineering**: August 2008 to May 2010
  - Peer mentor for incoming freshmen

Membership and Activities

- LaACES, HASP, and MARSLIFE projects at LSU
  - Team Cosmic – radiation detector
  - Pirogue – Biological Sampler
  - SMITH – Biological Sampler
  - Thousand Points of Life – Biological Sampler
- LSU IEEE Robotics Team
- Captain of a Lego Robotics team 1 year, Coach for 6 years
- Summer camp counselor for 6 years

Honors and Awards

- Presented design projects for LaACES, HASP, and senior design courses
- Presented at the summer undergraduate research forum (SURF – LSU 2006)
- Participated in parish and regional science fairs for 5 years, selected for International Science Fair 2 years
- Perfect score on the GEE and ACT in math
- Herbert Hoover Young Engineer Award in 2004 and 2006

Special Skills

- Software Tools
  - Solidworks
  - MATLAB
  - Microsoft Office
  - Parallax BASIC stamp
  - Arduino
  - Xilinx
- Programming Languages
  - C++
  - BASIC
  - Assembly
  - PCB Express
  - Verilog

Hobbies

Videogames, Robotics, computers, drawing, reading, archery, biking, swimming, space

Personal Statement

I was born and raised in the small town of Vacherie, Louisiana. I grew up in the swamps, living right on the water by Lake DesAlmonds, and have even fished out of my window. I have always had and interest in space and spent many nights looking up at the stars. My interest with robotics began in high school when I was asked to start up and run a Lego Robotics team for the school. Since then I have participated on one team and coached 9 teams over the past 9 years. I have also been involved with serveral other robotics competitions including IEEE and BEST. I like to play around with electronics in my free time including building my own computer and RC robotics. I have also enjoyed biking, biking around my school rather than driving. I have also taken up traditional archery, which was an interest of mine since I was younger.

I graduated high school with honors and began LSU in 2007. I knew I wanted to pursue robotics but could not attend a college with a larger robotics program due to financial reasons. At LSU I initially began as a Mechanical Engineer but after seeing that the departments focus did not coincide with my interest I switched to Electrical Engineering. Shortly after, I also began taking courses for a Computer Engineering degree. In May of 2012 I graduated LSU with degrees in Electrical Engineering and Computer Engineering and minors in Math and Digital Media. I am currently not planning to attend graduate school but would like to further my education in the future.

Jason Entenmann

University of South Florida
Tampa, FL
Electrical Engineering
Bachelor of Science
Email: entenmann@mail.usf.edu

Research and Experience

- **University of South Florida –** *Office Assistant, Department of Physics*: December 2011 to Present
  - Assisting students with registration difficulties in physics courses
  - Help prepare exams for professors
  - Data entry using Microsoft Word and Excel
- **Pacific Sun wear –** *Assistant Manager*: December 2006 to August 2010
  - Maintained complete customer satisfaction
  - Visual Merchandising
  - Hiring and Recruiting
  - Helped open/move stores all over Florida
- **Journey's –** *Co-Manager*: March 2006 to December 2006
  - Maintained complete customer satisfaction
  - Visual Merchandising
  - Obtaining the highest percentile in sales and numbers for that particular store
- **PALL Aerospace Engineering Firm –** *Query Programmer/Data Collector*: October 2005 to February 2006
  - Maintained information in a database
  - Wrote query strings to find and collect information for a multi-million dollar project until it was completed
  - Helped fellow engineers communicate with machinists on the floor
  - This was a temporary position

Membership and Activities

- Society of physics students
- X-Labs Engineering Club
- Fencing Club
- Volunteering at Physics Day bi-annually
- IEEE Society at USF

Honors and Awards

- Current Overall GPA: 3.78, Latest semester GPA: 4.0
- HTML Certification at Marchman Technical Education Center May '05
- Associates of Arts Degree May '09

Special Skills

- Software Tools
  - Windows OS
  - Apple OS
  - Excel
  - Word
  - PowerPoint
  - Adobe Photoshop
  - Flash
  - Google SketchUp
- Programming Languages
  - HTML
  - MATLAB
  - C++

Hobbies

- Racquetball
- Experimenting with Electronic building projects
  - Guitar distortion pedals
  - Arduino electronic projects

Personal Statement

My name is Jason Entenmann and I am a rising junior at the University of South Florida majoring in Electrical Engineering and minoring in Mathematics. I am currently a member of IEEE, Society of Physics students, and X-Labs, an engineering club that lets you interact with creative projects. I also volunteer every semester for Physics Day, an event that helps grade level students get more involved in mathematics and science. The event gives me the opportunity to inspire kids at a younger age, and let them know what it's like to be a college student majoring in engineering.

When I was younger, I was always interested in math, science, and just how everything works. There is no surprise I am where I am today. I have always been amazed in space travel and the universe and I am honored to be apart of that this summer.

I have a strong work experience in leadership and management skills, teamwork, computer skills, great customer service and much more. Aside from my studies I love doing anything exhilarating: skydiving, surfing, traveling, cycling, and playing racquetball are some activities I enjoy the most.

Matt Anderson

University of Michigan
Ann Arbor, MI
Aerospace Engineering
Bachelor of Science
Email: mjamich@umich.edu

Research and Experience

- **Edible Arrangements,** West Chester, OH: May 2011 to August 2011
  - Worked in teams to efficiently produce arrangements
  - Performed produce management for the next day as well as customer service
- **For Everybody Inc.,** Salt Lake City, UT: Summer 2010, 2008
  - Data Analysis of total costs for catalog items
  - Visual Studio data corrections
  - Worked as a Research and Development Assistant
  - Produced custom-ordered candles, performed quality control tests
- **King's Island,** Mason, OH: April 2009 to August 2009
  - Worked in Park Services – Ecology Department
  - Cleaned park by replacing trash cans

Membership and Activities

- **University of Michigan Mars Rover Team:** January 2011 to Present
  Information Systems Officer/Mechanical Team Member: January 2012 to April 2012
  - Manage the official Mars Rover Team website "www.umrover.org"
  - Maintain team resource/alumni database
  - Oversee officer transition

  Wilson Center Representative/Mechanical Team Member: January 2011 to April 2012
  - Act as Liaison between the Mars Rover Team and the U. of Michigan Wilson Center (student team center)
  - Organize team member training and access to engineering resources
  - Promote team interests with university faculty
  - Experience with welding, mill, and basic machinery
- **University of Michigan Epeians:** April 2012 to Present
  Service Chair: April 2012 to Present
  - Act as liaison between the Epeians and other student run engineering groups for coordination of service events.
  - Arrange "inside" service opportunities for members and initiates as well as provide information on "outside" service opportunities.

Honors and Awards

- Distinguished Initiate Award in the Epeians
- Graduated Cum Laude from Lakota West High School
- National Honor Society

Special Skills

- Software Tools
  - Windows 98/XP/Vista/7 – Experienced
  - Linux/UNIX based operating systems – Moderate
  - Abaqus, Solidworks - Moderate
  - Photoshop, Illustrator – Experienced
  - Microsoft Office – Experienced
  - Visual Studio/Enterprise – Basic
- Programming Languages
  - C++
  - Java
  - MATLAB
  - Mathematica

Hobbies

Digital sketching/painting, snowboarding, hockey, archery, and hiking

Personal Statement

This coming year I will be a senior at the University of Michigan majoring in Aerospace Engineering. Through my college years I have been heavily involved in a robotics team, The University of Michigan Mars Rover Team. I have had a great time on the team learning technical skills such as welding and milling, and have had the opportunity to lead through officer positions. The most rewarding aspect to being on an engineering team for me is seeing the final product that has been the focus of several months work come together and knowing that I had a large impact on the design.

Outside of school, I enjoy expanding my artistic abilities through digital art, a hobby that I can attribute to my brother, whom I aspire to one day match. Along with digital art, I also enjoy snowboarding. Although I may not currently live in a mountainous region, having grown up in Ohio and now attending school in Michigan, I have been fortunate to make several ski trips to the West that have been extremely fun.

Like many kids growing up, I was fascinated with flight. The ability to soar through the heavens and beyond into the stars is, in my mind, mankind's greatest achievement. I have always dreamed of being a part of this experience and impact the world with my work. I am very excited to have this unique opportunity of an internship with NASA and believe it will help move me closer to fulfilling this dream.

FeatherSail Team

The Robotics Academy team is designing a solar sail satellite that deploys 16 sails. Pairs of sail can be rotated independently about the axis of the boom they are mounted to, which is referred to as “feathering”. With unique combinations of sail feathering, the satellite can obtain a very simple means of attitude control about all three principal axes.

With this degree of maneuverability, many long-duration complex missions are possible. For example, FeatherSail could easily obtain a polar orbit about the sun, maintain a non-Keplerian orbit at any lagrangain point, or be able to frequently change position in earth orbit. These missions are possible because FeatherSail utilizes solar propulsion and therefore, fuel reserves will no longer be the limiting factor on mission duration.

The student team is responsible for four main design focus areas that should yield a near-complete design. The first focus area is the mission concept, design, and detailed analysis proving feasibility. Second, the avionics components will be selected to minimize weight and power while achieving mission defined science and operational objectives. The third area is structural design, including bus, pods, deployable booms, and de-tumble stage. Finally, all mechanisms will be designed; particularly the ones that drive the sail feathering, boom deployment, and de-tumble stage separation.

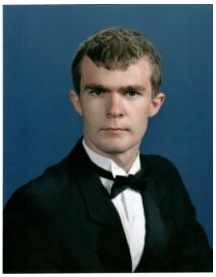
Principal Investigator: *Dean Alhorn*

Team Lead: *Kevin Schillo*

Research Associates: *Joshua Sandler*
Lonnie Labonte

Kevin Schillo

University of Alabama Huntsville
Huntsville, AL
Aerospace Systems Engineering
Master of Science
Email: Aliasmabus@yahoo.com



Research and Experience

- **UAH Department of Mechanical and Aerospace Engineering –** *Graduate Research Assistant:* August 2011 to Present
  - Writing Matlab simulations and control code for a lunar rover as part of the Google Lunar X-Prize Competition
- **UCF Department of Mechanical, Materials, and Aerospace Engineering –** *Research Assistant:* January 2009 to January 2011
  - KnightSat II project, UCF's entry in the University Nanosatellite Program, a national satellite design and fabrication competition intended to culminate in the building and launching of a nanosatellite with a maximum mass of fifty kilograms.
- **UCF Department of Engineering Technology –** *Research Assistant*: January 2008 to May 2008
  - Designed a blended wing body aircraft as part of the 2007-2008 NASA Fundamental Aeronautics Student Competition.
  - Wrote a paper on the feasibility of using kinetic impact deflection as a technique to protect Earth from threatening asteroids
  - Designed a supersonic commercial transport aircraft as part of the 2008-2009 NASA Fundamental Aeronautics Student Competition.

Membership and Activities

- American Institute of Aeronautics and Astronautics (AIAA)
- Rocket City Space Pioneers

Honors and Awards

- Honorable mention, Small Satellite Conference Frank J. Redd Scholarship, August, 2011
- 2nd place winner of UCF Showcase for Undergraduate Research for KnightSat II research, April, 2011
- Winner of the student essay competition for the Next Generation Suborbital Researchers Conference, February 2011.
- UCF Pegasus Scholarship
- Boeing Company Scholarship
- Dean's List
- National Scholars Honor Society

- National Society of Collegiate Scholars
- National Society of Leadership and Success, (Sigma Alpha Pi)
- National Leadership Honor Society (Omicron Delta Kappa)

Special Skills

- Software Skills
  - MATLAB with Simulink
  - Gambit with Fluent
  - Solidworks
  - AutoCAD
  - MS Office Suite
  - Windows XP, Vista, and 7
  - Mac OS X

Hobbies

Working out, surfing, scuba diving, writing science fiction novels.

Personal Statement

Kevin Schillo obtained a Bachelor of Science in Aerospace Engineering with a minor in mathematics from the University of Central Florida in 2011. During his undergraduate studies, he participated in numerous engineering projects, such as the KnightSat II project, UCF's entry in the University Nanosatellite Competition. Kevin was a crucial participant in this project, simulating the satellite's orbital lifetime and developing the attitude control system. Kevin wrote a paper detailing his research on this subject, which was accepted as one of only six entrants from around the country to participate in the annual Frank D. Weld Scholarship Competition at the Small Satellite Conference. Kevin and his co-author were also the only undergraduates to participate in this iteration of the competition.

Kevin has always had a profound interest in science fiction and the future of space development, a passion that he has expressed in the form of his first publication, the novella "Apotheosis," which was published in the anthology "Against a Diamond Sky" as part of the Orion's Arm Universe Project. Kevin further demonstrated his prowess at expressing the beauty and majesty of the cosmos and humanity's role in it in the form of his essay "Allure from Afar," which garnered him the student essay award at the Next Generation Sub-Orbital Researchers Conference in 2011.

Kevin is currently pursuing a Master of Science in Aerospace Systems Engineering at the University of Alabama in Huntsville. He is working with the Rocket City Space Pioneers to develop control algorithms for a lunar rover as part of the Google Lunar X-Prize.

Joshua Sandler

Georgia Institute of Technology
Atlanta, GA
Aerospace Engineering
Bachelor of Science 2013
Email: JSandler@gatech.edu

Research and Experience

- **Honda Aircraft Company –** *Engineering Co-op, Stress Group*: August 2011 to December 2011
  - Created strain predictions with Femap, TMP SLIM, and Excel/VBA. Correlated with test data.
  - Created tools to help analyze and chart strain data from static tests using Excel and VBA.
  - Performed stress analysis using classical hand analysis methods.
  - Installed strain gauges on test coupon.
- **Honda Aircraft Company –** *Engineering Co-op, Aerodynamics*: January 2011 to May 2011
  - 2D & 3D unstructured CFD with Gridgen (mesher), Fun3D (solver), and Tecplot (visualization).
  - CAD geometry cleanup for CFD, solid and surface modeling using CATIA v5.
  - Tool creation/programming using Excel, VBA, and Fortran 90/95.
  - Planned and performed strain gauge load calibration test. Supported modal analysis testing.
- **GT Intelligent Control Systems Laboratory –** *Research Assistant*: May 2010 to August 2010
  - Worked on design, analysis, and fabrication of flapping wing micro aerial vehicles.
- **Slingshot Product Development Group –** *Design Engineer Co-op*: January 2010 to May 2010
  - Worked in start-ups division to help conceptualize and create new products for clients.
  - Involved in design, machining/prototype fabrication, and product testing.

Membership and Activities

- **GT Student Center Programs Council,** *Homecoming Chair, 2010*
- **Omicron Delta Kappa,** *Treasurer, Spring 2012* to *Present* – National Leadership Honor Society
- **GT Student Government,** *Co-op Representative, Spring 2012 to Present*
- **GT RoboJackets** – FIRST Robotics Competition Mentoring

- **Technique & Blueprint** *(GT Newspaper & Yearbook), Staff Photographer*
- **Alpha Epsilon Pi,** *Risk Manager, Alumni Chair, Webmaster*
- **Sigma Gamma Tau** – National Aerospace Engineering Honor Society
- **Student Advisory Board member** for Georgia Tech Clough Undergraduate Learning Commons

Honors and Awards

- National Merit Scholar
- Faculty Honors, Dean's List

Special Skills

- Software Skills
  - MATLAB with Simulink
  - CATIA v5, Solidworks, AutoCAD, Inventor
  - Femap/Nastran
  - Gridgen
  - Adobe Photoshop, Illustrator, Acrobat
- Programming Languages
  - Java
  - VBA

Hobbies

Photography, watching sports, reading

Personal Statement

Josh was born and raised in Des Moines, IA. Growing up, he always had an interest in engineering and space. He moved to Atlanta, GA before high school and participated actively in the FIRST Robotics Competition. Josh followed his interest in engineering by enrolling at Georgia Tech and majoring in Aerospace Engineering. He will graduate in May 2013. Since he has been at Tech, Josh has researched micro unmanned aerial vehicles and co-oped in the product development and aircraft industries. Outside of academics, he is involved in student government and with the Georgia Tech newspaper.

Josh is participating in NASA Marshall Space Flight Center's Robotics Academy as a member of a team working on development of a solar sailcraft.

Lonnie Labonte

University of Maine
Orono, ME
Electrical Engineering
Bachelor of Science
Email: Lonnie.labonte@umit.maine.edu

Research and Experience

- **New Page Corporation, Rumford, Maine**: May 2010 to August 2011
  - Shipper/Fork Lift Clamp Truck Driver
  - 12+ Hour shifts, 40+ hours a week
  - Worked as a team to meet expected tonnage paper moved
- **University of Maine, Orono, Maine**: August 2010 to December 2010
  - Teachers Assistant for Electrical Networks Lab
  - Assisted students with building artificial intelligent robots
  - Robots were able to complete random maze using photo diodes and LED's
- **Subway, Mexico, Maine**: May 2008 to August 2009
  - Cashier, Sandwich Artist and food preparation

Membership and Activities

- IEEE member

Honors and Awards

- NSHSS honoree member
- Dean's List fall of 2011 and spring of 2012

Special Skills

- Hardware
  - IBM Compatible
  - Macintosh
  - Internal/External Components
- Systems
  - Windows
  - Mac OS
  - Linux

- Software Skills
  - Matlab
  - Microcap
  - Spreadsheets
  - Graphics/Drawing/Painting Tools
  - PowerPoint
  - AutoCAD
- Programming Languages
  - True Basic
  - Microsoft Visual
  - C

Hobbies

- Weight Lifting
- Skiing
- Tennis
- Watching Professional Sports of All Kinds

Personal Statement

I am a hard working student who gets motivation from seeing the opportunities I have ahead of me in life. I have always been an above average student especially in math; I decided to major in electrical engineering at the University of Maine because of my skills in math and my interest in advancing technology. I was amazed when I learned of the opportunity I was presented with this summer; to work for NASA has been my dream job for years now, even if it is only for a summer I will be pleased. I am currently a rising senior and have learned so much with my time at the University of Maine and will further my knowledge in engineering as well as learn about astrology and aeronautics. I have taken it upon myself to become a well-rounded student with knowledge in many fields and will do my best to do this in the future as well. I am a sociable guy who enjoys research and development in the field of electrical engineering and will make the most of my experience this summer.

Flight Robotics Laboratory Team

The Robotics Academy team is designing, developing, and building a base for a FASTSAT mockup that performs as a satellite bus in a frictionless environment similar to that in space. The in-space application of this design will be as part of a system for performing maintenance on ("servicing") satellites and space stations, as well as for investigation of low-gravity objects such as asteroids and small moons. The base will be able to operate in teleoperated and partly-automated modes. It will maneuver around a target by achieving situational awareness of target range and orientation.

The student team is responsible for all aspects of design, development, and operation of the base. The integrated design includes sensors and avionics and software for interpretation of sensor data and turning them into flight commands. The actuators for maneuvering will be cold-gas thrusters. This integrated design will thus include the structural layout of the base, the avionics and software required to achieve situational awareness and the thrusters to control it, as it "floats" on the Flight Robotics Laboratory flat floor. Operations on the flat floor will consist of testing the base for accuracy of sensor and control systems.

Principal Investigator: *Ricky Howard*

Team Lead: *Joaquin Labrado*

Research Associates: *Elizabeth Qian*
Dacen Waters

Joaquin Labrado

University of Texas at San Antonio
San Antonio, TX
Electrical Engineering
Master of Science 2013
Email: JDLabrado@gmail.com

Research and Experience

- **Graduate Researcher –** August 2011 to Present
  - Currently researching methods of Adaptive control schemes for use in UAVs and UGVs for Rendezvous and Docking procedures.
  - Also working on network control schemes for robotic swarms
- **Undergraduate Research Assistant –** June 2010 to May 2011
  - With a team of graduates and undergraduates created teams of soccer and sumo robots for the use of K-12 students.
  - The project will help them learn about engineering by programming the robots themselves.
- **Undergraduate Researcher LSAMP –** June 2009 to June 2010
  - Researched and designed a robotic swarm for search and recovery operations.
  - Designed PID controllers for each motor with IR distance Sensors and developed an algorithm to switch between different scenarios.

Membership and Activities

- Mexican American Engineers and Scientists
  - Regional Representative 2008
  - Secretary 2009
  - Member 2007 to Present
- Society of Hispanic Professional Engineers
  - Member 2007 to Present

Honors and Awards

- Dean's List 2010
- Honor Roll 2010, 2011

Special Skills

- Software Tools
  - Microsoft Office
- Programming Languages
  - MATLAB
  - MATLAB Simulink
  - C/C++
  - Java
- Hardware
  - Arduino Microcontrollers

Hobbies

Football, Outreach, Random tinkering with computers, hiking, camping, fishing.

Personal Statement

My name is Joaquin Daniel Labrado, and I am an Electrical Engineering student at the University of Texas at San Antonio. I graduated from UTSA in May 2011 and I then applied to and was accepted to graduate school at UTSA. During my time at UTSA, I was on the Dean's list in fall 2010 and on the UTSA Honor Roll in spring 2010 and spring 2011. I was part of the LSAMP (Louis Stokes Alliances for Minority Participation) program, which helped me start working in a research lab setting. I currently work in the Autonomous Control Engineering Lab or ACE Lab, with Dr. Mo Jamshidi. I did research in the area of swarm robotics, and the different ways to get robots to communicate and interact with each other though Bluetooth. To graduate I had to work with a team to create a device completely from scratch. My group constructed a device to scan strawberries for mold or defects, and remove the unsatisfactory fruit. I worked on controlling the speed of a motor to sweep the fruit off the line, and I worked on interfacing the whole system with MATLAB. Currently for my master thesis, I am currently working on an algorithm for autonomous rendezvous and docking for rovers or aerial robots though the use of state feedback controllers and adaptive controls.

Aside from all the technical work I have done, I also do a lot of outreach for the community. I have participated in Dream Runners, which has student from all colleges talk to elementary school children and tell them about the different majors and what it takes to go to college. In addition, I have been a committee member for MAES (Mexican American Engineers and Scientists) Science Extravaganza, which allows middle school children to learn about engineering through fun workshops. I have also helped many high school kids pick a specific engineering major.

Elizabeth Qian

Massachusetts Institute of Technology
Cambridge, MA
Aero/Astronautics
Bachelor of Science 2014
Email: elizqian@mit.edu

Research and Experience

- **MIT Space Systems Laboratory, Cambridge, MA**
  Undergraduate Research Assistant, February 2011 to May 2012
  - Developed Simulink models of antenna radiation and satellite motion under reaction wheel control for TERSat (a cubesat intended to characterize the plasma environment in the Van Allen radiation belts)
  - Worked with avionics team to prepare flatsat demonstration for TERSat CDR; tasks included testing and calibration of TERSat hardware
  - Contributed experience on ADCS, Power, and Avionics teams to update TERSat design document after mission change; co-authored a paper submitted to the 2012 SmallSat conference
- **University of Michigan Aerospace, Robotics, & Controls Laboratory, Ann Arbor, MI**
  Research Intern, May to September 2009
  - Used Vicon motion capture system to collect data on health of unmanned aerial vehicles (UAVs)
  - Developed numerical MATLAB simulations of UAV health in a system of multiple UAVs and autonomous battery-swapping station; simulated projections of UAV performance characteristics were used in a paper submitted to the 2010 IEEE conference
- **Highlights for High Schools Initiative, Germany**
  Teacher, June to August 2010
  - Worked in a team of five to plan one-week science and technology programs for students in Germany
  - Organized and taught multiple workshops each week to German students; topics covered include genetic analysis, gyroscopes and applications, special relativity, and principles of propulsion
  - Communicated in German to coordinate with faculty at host institutions to match lesson plans to host curricula

Membership and Activities

- AIAA
- MIT Concert Choir
- MIT Educational Studies Program

Honors and Awards

- National Merit Scholar (2010)
- AP Scholar with Distinction

Special Skills

- Software Tools
  - Microsoft Office Suite
  - Photoshop/Graphics Tools
- Programming Languages
  - MATLAB, Simulink
  - HTML, CSS
  - Java

Hobbies

- Teaching, music (violin, piano, voice), tennis, French, German, books, writing

Personal Statement

I grew up in Ann Arbor, MI, and I have wanted to design space systems ever since I saw a PBS special on Spirit and Opportunity when I was twelve. As my education progressed, I found that I liked math and physics, and I loved everything related to space exploration, so aerospace engineering was a natural choice for my college major. My interest in unmanned planetary exploration led me to accept this position at the NASA Robotics Academy. After completing my undergraduate studies, I would like to continue my education in a doctorate program in aerospace.

Beyond my studies in aerospace, I have a strong interest in teaching and education. With the MIT Educational Studies program, I taught an AP Chemistry class for local high school students and have taught for a number of one-day educational outreach programs. Over the summer, I work as a counselor for my high school's one-week orchestra camp, where I work with students to teach violin technique and music theory. I really enjoy music, and I have been part of the MIT Concert Choir as well as the MIT Symphony Orchestra. My other interests and hobbies include good books, foreign languages, cooking, square dancing, biology, and Michigan football.

Arkansas Tech University
Russellville, AR
Physics and Mechanical Engineering
Bachelor of Science
Email: dacen.c.waters@gmail.com

Research and Experience

- **ATU Physics Department, Undergraduate Research Assistant –** Fall 2010 to Present
  - Investigated electron fluid dynamic models to describe current bearing antiforce breakdown waves. Findings reported in five presentations and two publications.
  - Investigated various cases of dark energy interaction models. Findings reported in one presentation. Research pending.
- **ATU Mechanical Engineering Department, Tutor –** Spring 2012 to Present
- **ATU Physics Department, Lab Assistant –** Spring 2011 to Present

Membership and Activities

- Alpha Tau Omega Fraternity: September 2010 to Present
  - Executive Board, Philanthropy Chair: November 2010 to November 2011
  - Interfraternity Council Delegate: November 2010 to November 2011
- Interfraternity Council
  - Executive Board, Vice President of Development: November 2011 to Present
- Greek Programming Board
  - Co-Executive Director: November 2011 to Present
- ATU Physics Club
  - President: November 2011 to Present

Honors and Awards

- Student Undergraduate Research Fellowship. $4,000. “Current Bearing Breakdown Waves”
- NASA’s Workforce Development Grant. $6,500. “Current Bearing Electron Breakdown Waves.”
- Arkansas Tech University Undergraduate Research Fellowship. $3,000. “Exploring Interacting Dark Energy Models.”
- Most Outstanding Physics Student: Spring 2012
- Physics Department Senior Fellowship: Spring 2012

Special Skills

- Software Tools
  - SolidWorks
  - MATLAB
  - Maple
  - PSpice
- Programming Languages
  - C Programming
  - Visual Basic

Hobbies

Reading, guitar, ukulele, disc golf, hiking

Personal Statement

I began my college education as a Mechanical Engineering major, minoring in math, and planning to obtain an Associate's in Nuclear Technologies, as most mechanical engineers do at my school. I took a physics one class the summer after my freshman year and greatly enjoyed the class. The professor approached me early the next semester about double majoring in physics, and with his guidance I have been very successful. I am the first to do this at my school. I have sparked a lot of interest with professors and younger students and now there are a few younger students attempting it as well.

I am a proud member of the Alpha Tau Omega Fraternity. I am a founding father of my chapter at ATU. Since joining in 2010, I took one of the most challenging and respected executive positions as the community service and philanthropy chairman. I started the program from scratch and it is now one of the most recognized and envied aspects of our chapter. From that point, I went on to take many leadership positions, both within Greek life and in the greater community. I am in charge of two new boards that are being established on our campus. I was recognized at the end of the Spring 2012 term as the Greek Man of the Year for my participation in the Greek community as well as on campus. The leadership techniques I have learned and the experiences I have had from these opportunities, as well as from the opportunities this summer will bring, are priceless.

After graduation, I plan on attending graduate school for physics to obtain a Ph.D. As of now, I plan to have a concentration in cosmology and astrophysics, however, I will reserve my final decision until I am a little further in my education. I would like to work for NASA in the future as a research physicist, and hopefully retire to teach at a university and pursue independent research.

Flight Manipulator Development Team

The Robotics Academy team is designing and developing a manipulator for evaluation of tasks in a frictionless environment similar to that in space. The in-space application of this design will be as part of a system for performing maintenance on ("servicing") satellites and space stations, as well as for investigation of low-gravity objects such as asteroids and small moons. The manipulator will be able to operate in teleoperated and partly-automated modes. It will perform such servicing tasks as grasping/grappling/dexterous docking, tool tasks, and component removal and replacement. For exploration of rocky objects, it will provide both capture and sample-collection capabilities.

The student team is responsible for all aspects of design, development, and operation of the manipulator. The primary focus of the activity is understanding the relationship between the mission, the requirements that derive from the mission, and the design and operation of the manipulator system. The integrated design is thus based on requirements that flow from the mission concepts and decomposition of the manipulator tasks. This integrated design will include the structural layout of the manipulator, the avionics and software required to control it to meet the requirements, and the platform on which the system will be "floated" on the Flight Robotics Laboratory flat floor. Operations will take two forms: testing to assure requirements compliance, and integrated operations. Integrated operations will involve other platforms, including a "satellite bus" base developed by another Academy team and a target on which to perform demonstration tasks. A final aspect of operations will be conducted, as time allows. The team will connect the manipulator to the remote Virtual Environments Laboratory and will operate it using virtual reality interfaces.

Principal Investigator: *Charles Dischinger*

Team Lead: *Andrea Hughes*

Research Associates: *Margaret Raughley*
Erich Laux

Andrea Hughes

University of Tennessee
Knoxville, TN
Geology/Planetary Geosciences
Master of Science
Email: achughes@gmail.com

Research and Experience

- **University of Tennessee –** *Graduate Student Research Assistant:* January 2009 to Present
  - Organize and lead research project interpreting history of water on Mars, thereby identifying possible sites for future landed Martian exploration missions
  - Process and interpret spectroscopy data using IDL/ENVI
  - Use a geographic information system (ArcGIS) to co-analyze and characterize remotely sensed data
  - Process data and infer thermal inertias of Martian surface
- **University of Tennessee –** *Graduate Teaching Assistant:* January 2009 to December 2011
  - Taught 12 laboratory sections of intro Geology courses
  - Set course goals for semester by organizing, planning, and executing weekly lectures and experiments
  - Worked individually and collectively with ~350 students to help them succeed in accomplishing course goals
- **Johns Hopkins University Applied Physics Lab –** *Research Intern, CRISM Research Project: Summer 2009, 2010*
  - Identified hydrated minerals on Mars by processing and interpreting spectroscopy data from Compact Reconnaissance Imaging Spectrometer for Mars (CRISM)
- **Johns Hopkins University Applied Physics Lab –** *Research Intern, SuperDARN Research Project: Summer 2008*
  - Interpreted density irregularities in E-region of Earth's ionosphere using data from Super Dual Auroral Radar Network (SuperDARN) and IDL programming language
- **Florida Tech, Geospace Physics Lab –** *Undergrad Research Assistant, Lightning Research: August 2004 to May 2008*
  - Manufactured and assembled "Lightning Boxes" to detect high energetic radiation in thunder storms
  - Interpreted qualities of Earth's atmosphere using data of X-ray emissions from lightning

Membership and Activities

- University of Tennessee Geology Club
- American Geological Institute (AGI)
- Association for Women Geoscientists (AWG)

Honors and Awards

- Phi Eta Sigma National Honor Society
- Sigma Pi Sigma Physics Honor Society
- American Geological Institute Minority Participation Program (AGI MPP) scholar
- Undergrad Dean's list three semesters

Special Skills

- Bilingual: Conversational Thai and basic Thai reading/writing
- Software Tools:
  - ArcGIS
  - IDL/ENVI
  - Adobe Illustrator
  - MS Office
- Programming Languages
  - IDL, FORTRAN

Hobbies

Traveling, cooking, singing, playing guitar, reading, socializing, exercising

Personal Statement

Being raised in a military family, Andréa spent much of her childhood living and traveling abroad. She earned her high school degree in 2004 from Baltimore City College in Baltimore, Maryland. She completed a Bachelor of Science degree in Space Sciences at Florida Institute of Technology in 2008. As an undergraduate, studyied high energetic radiation associated with lightning. Andréa earned a Master of Science degree in Geology (concentrating in Planetary Geosciences) from the University of Tennessee in 2012. Her master's research involved characterizing hydrated minerals and morphologies associated with putative Martian deltas in order to better understand the climatic and geologic history of Mars. Andréa's dream career is to work as a research scientist and Mission Operations Specialist at the National Aeronautics and Space Administration (NASA), where she hopes to help organize and execute manned, robotic, and spacecraft exploration missions of planetary bodies.

Margaret Raughley

University of Alaska, Fairbanks
Fairbanks, AK
Physics
Bachelor of Science
Email: meraughley@yahoo.com

Research and Experience

- **Hand Grinding a mirror for a telescope in Fairbanks**: Fall 2011 to Spring 2012
  - Sanding with increasingly fine materials
- **Advanced Physics Lab in Fairbanks**: Fall 2011
  - Collecting data and comparing results
- **Office Assistant for United Campus Ministry**: Fall 2009 to Fall 2011
  - Maintain records
- **Camp Counselor for Bethel Park, New Paris**: Summer 2009, 2010
  - Supervised and coordinated activities of children of twelve to seventeen

Membership and Activities

- United Campus Ministry (Fall 2009 to Present)
- Fishertown Community Band (Spring 2006 to Present)
- National Honor Society
- Spanish National Honor Society
- Volunteering
  - Love INC in Everett
  - Loving Companion Animal Shelter
  - Food Bank in Fairbanks
  - Beans Café in Anchorage
- Legolab (2002)

Honors and Awards

- Website: “Maximizing Meals.”
- Numerous Awards for Teens Involved (2005 to 2008)
  - Flute Duet
  - Solo Performance
  - Drama

Special Skills

- Software Tools
  - Matlab and Octave
  - Microsoft Office
  - Work with Windows and MacIntosh
- Other
  - Playing Flute and Piccolo

Hobbies

Crocheting, Flute, Playing Games, Reading, Walking

Personal Statement

When I was a toddler in McKeesport, Pennsylvania, my father would walk with me around the block to get me to fall asleep. Those nights walking under the stars were the beginning of my fascination with space. About six years later after my family moved to Madison, Pennsylvania, I participated in Legolab, which is a lego robotics program. Several years later my family moved again to Point, Pennsylvania, which is a rural town, where I went to high school.

Not only during my high school career in Bedford County was I a part of NHS, SNHS, FBLA, Youth Group, High School Marching Band, and Concert Band, but in June 2007 I went on a leadership trip to Russia with LeadAmerica. The trip opened my eyes to my interest in exploring the world, which lead me to schooling in Alaska.

I have been attending college at the University of Alaska, Fairbanks ever since. I continue playing my flute for the Fishertown Community Band and the Wind Symphony at UAF. I volunteer at the Fairbanks Food Bank and Loving Companions Animal Shelter. I am the secretary of United Campus Ministry and help organize activities.

Seeing the Aurora in Fairbanks reminds me of how amazing the universe is and how much I want to discover its mysteries. I plan on graduating in May 2013 and through my work at the Robotics Academy and my next year of schooling decide specifically what mystery of the universe I want to explore.

Erich Laux

University of Michigan
Ann Arbor, MI
Electrical Engineering
Bachelor of Science
Email: erichlau@umich.edu

Research and Experience

- **University of Michigan, Science Learning Center –** *Monitor*: September 2011 to April 2012
  - Oversee operations in the center and help with technology support
- **Busch's Grocery Store –** *Cashier:* June 2011 to September 2011

Membership and Activities

- Member of Solar Car mechanical engineering division for 2 semesters
  - I helped design build the car named Quantum that won 3rd place at the 2011 World Solar Challenge in Australia
- Member of LOL ROFL Stand-Up Comedy Club for 4 semesters (President for 2 semesters)
- Member of MOTTley Crew volunteer organization for 4 semesters
  - We fundraised for and put on fun activities for the patients at Mott Children's Hospital and the children's hospital at the Detroit Medical Center
- Tornado Relief
  - In May 2012, I went on a trip to rebuild houses damaged by tornadoes in Henryville, Indiana.
- Habitat for Humanity
  - Spent a week in Appalachia, Tennessee in both the summer of 2009 and the summer of 2011 to help build houses for people in need
- Played one semester of Rugby on the U of M Men's Rugby Club Team
- Pinckney Pirate Day Camp
  - The past two summers I volunteered weekdays assisting with 1st through 7th grade children who were attending the Day Camp
  - It was a total of over 150 hours of volunteering at Day Camp in 2010
- Officer (Secretary) of National Honor Society at Pinckney High School
  - Worked the Empty Bowls dinner to help feed the needy
  - Volunteered at March of Dimes to raise money for sick babies
  - Participated in Relay for Life
  - Started a free tutoring program at school
  - Helped organize/run a bottle drive, coin drive, and other fundraisers for the American Cancer Society and March of Dimes

Honors and Awards

- In 2010, my Tic-Tac-Toe playing robot won its Electrical Division, and also Best in Show at the Michigan Industrial Technology Education Showcase (MITES) regional competition
- In 2010, I won the silver medal at the Skills USA Michigan Robotics and Automation competition
- In 2009, I won the gold medal at the Skills USA Michigan Robotics and Automation competition
- In 2009, I got 5th in the country at the Skills USA Robotics and Automation national competition
- In 2008, I won the silver medal at the Skills USA Michigan Robotics and Automation competition
- I was given an award from my high school for showing excellence in the field of robotics and automation

Special Skills

- Software Tools
    - MATLAB
    - SolidWorks
    - Programmable Logic Controllers
- Programming Languages
    - C++

Hobbies

Ice Hockey, Stand-up Comedy, Trapshooting, Robotics

Personal Statement

I grew up in the small town of Pinckney, Michigan. I was raised a University of Michigan fan because my mother is alumna. After graduating Summa Cum Laude from Pinckney High School, where I gained a lot of robotics experience, I decided to attend the University of Michigan. I will be a junior in the fall 2012 semester. I plan to graduate with my degree in electrical engineering in the winter of 2014. I hope to use my knowledge to pursue a career in robotics related engineering.

Staff

Program Director

Christopher Randall *chris.randall-1@nasa.gov*

Christopher Randall manages the Co-op Program for MSFC's Office of Human Capital. In addition to his previous engineering duties, he had worked with the Marshall Center's Office of Academic Affairs as a mentor and recruiting assistant. A graduate of Alabama A&M University in Huntsville, he helps students there with senior engineering design projects, and emphasizes the importance of technology-driven careers. Randall also was a participant in the NASA leadership development program called NASA's Foundations of Influence, Relationships, Success and Teamwork program, or "FIRST." He became a co-op at the Marshall Center in 2005, and joined the center full-time after he graduated from college in 2006. Randall has worked on life support systems for the International Space Station, component design and development for the Ares I rocket and supported the space shuttle program at NASA's Kennedy Space Center, Fla.

Program Manager

Dr. Gerald R. Karr *karr@eng.uah.edu*

Dr. Karr is a Professor of Mechanical and Aerospace Engineering at UAH. Since 1992, Dr. Karr has also served as the UAH Campus Director of the ASGC. Dr. Karr also served as the Chair of the Mechanical and Aerospace Engineering Department at UAH from 1986 through 1999. Dr. Karr has, since 1978, been the University Director of the highly successful NASA Summer Faculty Research Opportunity (NSFRO) program. Dr. Karr has also been an active researcher in the areas of satellite drag, high-energy lasers, cryogenics, spacecraft thermal design and computational fluid mechanics. Dr. Karr earned his BS (1964), MS (1966), and PhD (1969) in Aeronautical and Astronautical Engineering at the University of Illinois at Champaign-Urbana. For recreation, Dr. Karr enjoys golf, running, sailing and visiting with his children and grandsons.

Operations Manager

William Burns *wkburns42@students.tntech.edu*

Will is an alumnus of the 2011 NASA Robotics Academy at MSFC. He will graduate in May 2013 from Tennessee Technological University with a Bachelor of Science degree in Electrical Engineering and a minor in Business and Math. For his final undergraduate year, he plans to work with a multidisciplinary team of undergraduate engineers on a Capstone Design Project. Will plans to pursue a Master's of Science degree in either Electrical or Aerospace Engineering with a focus in Controls. Eventually, Will plans to pursue a Master's of Business Administration.

Outside of school and work, Will enjoys playing lacrosse, traveling, reading, hiking, and playing guitar. He also takes pleasure in spending quality time with family and friends.

Links

- ***NASA MSFC Robotics Academy:***
  http://robotics.msfc.nasa.gov/

- ***NASA Robotics Academy Alumni Association:***
  http://www.roboticsalumni.org/

- ***NASA Academy Alumni Association:***
  http://www.nasa-academy.org/

- ***NASA Agency:***
  http://www.nasa.gov

- ***NASA Marshall Space Flight Center:***
  http://www.msfc.nasa.gov/

- ***Botball Robot Competition:***
  http://www.botball.org/

- ***For Inspiration and Recognition in Science and Technology:***
  http://www.usfirst.org/

- ***International Space University:***
  http://www.isunet.edu

- ***The Soffen Memorial Fund:***
  http://www.nasa-academy.org/soffen/fund.html